Ensuring Water for Navigation

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State of Oklahoma
OWRB
WATER RESOURCES BOARD
the water agency

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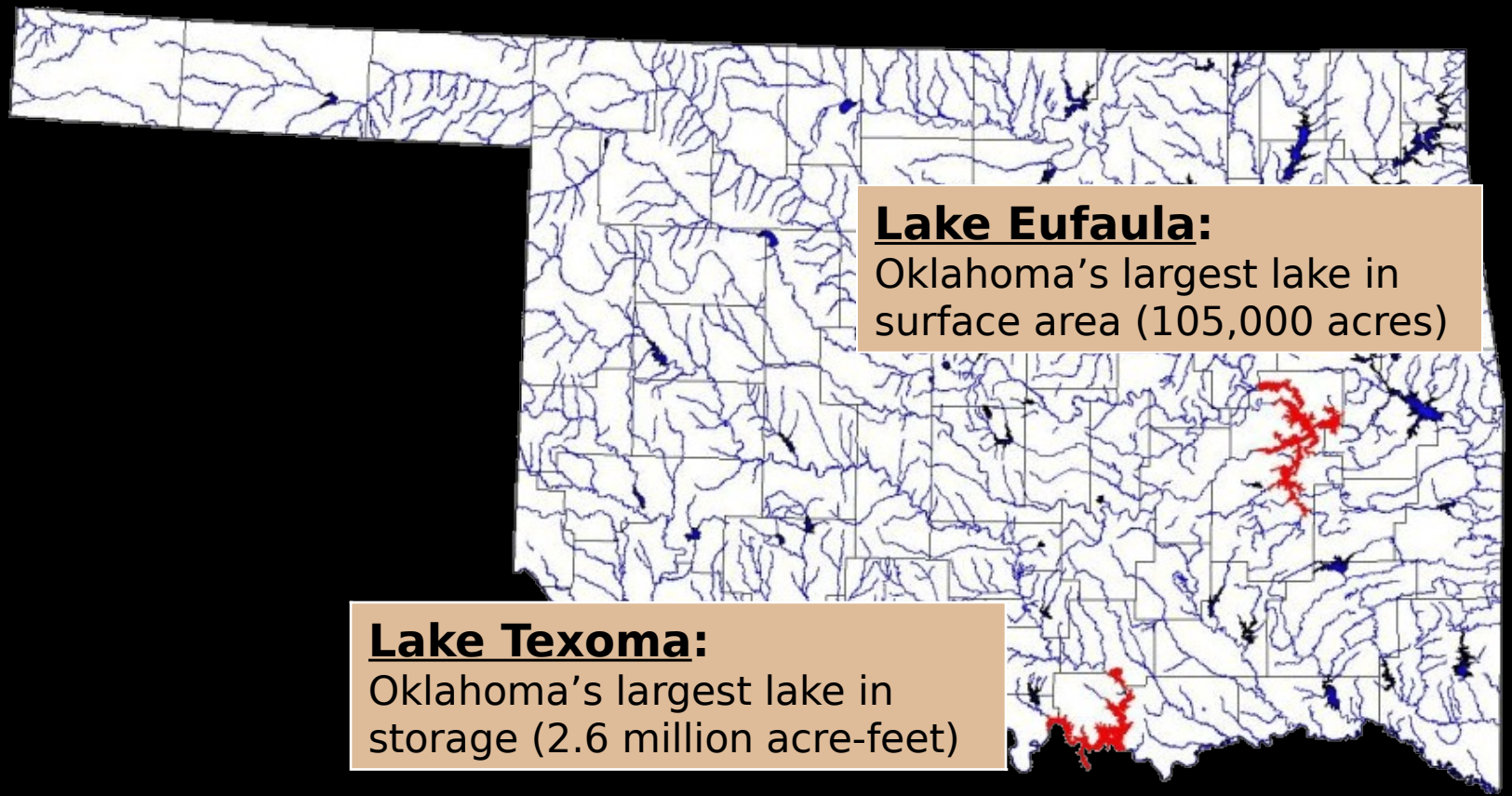
Where is Oklahoma's Water?

- 34 major reservoirs store 13 million acre-feet of water

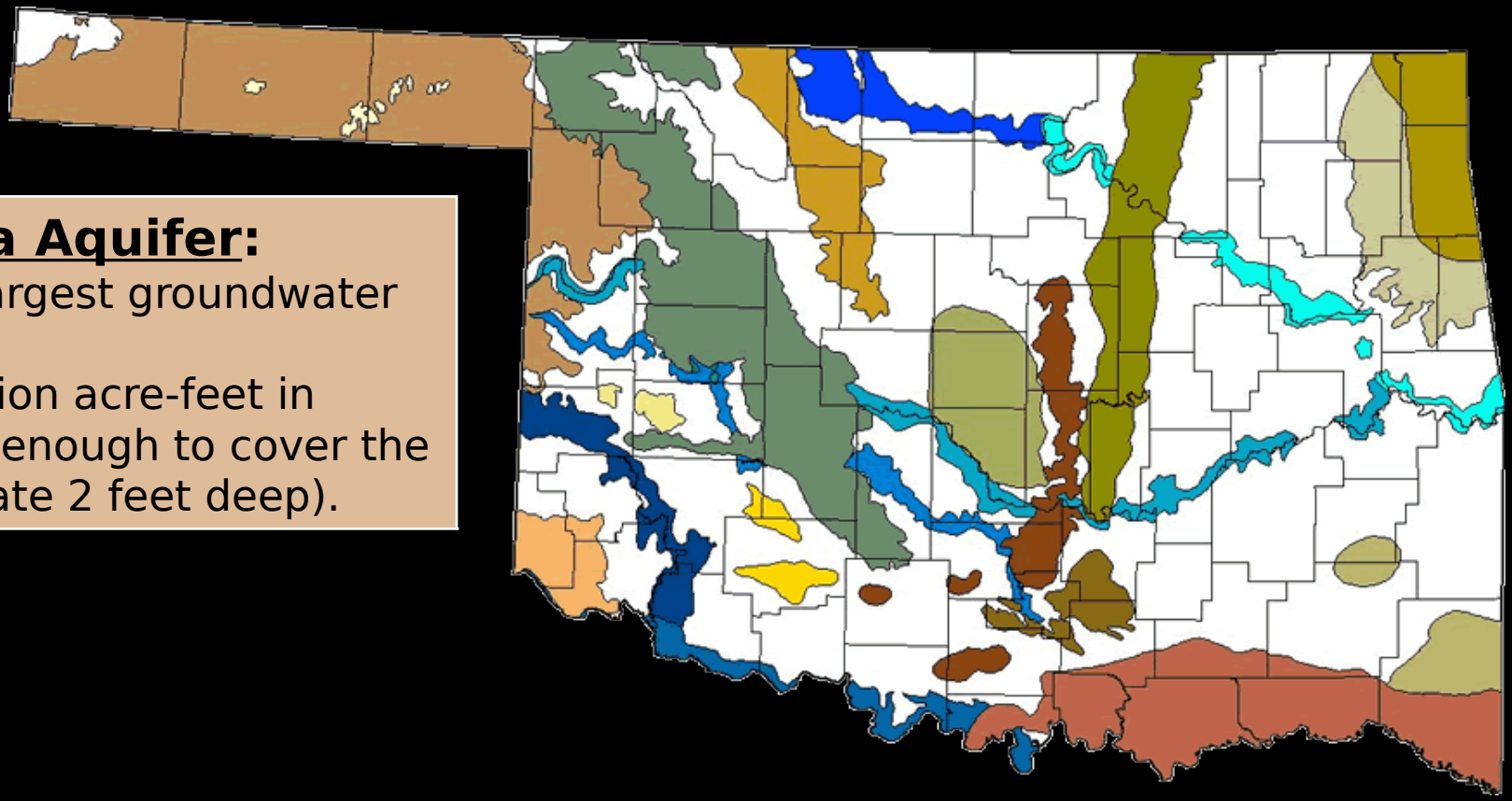


Lake Eufaula:
Oklahoma's largest lake in surface area (105,000 acres)

Lake Texoma:
Oklahoma's largest lake in storage (2.6 million acre-feet)

Where is Oklahoma's Water?

- 23 major groundwater aquifers store 320 million acre-feet of water



<u>Ogallala Aquifer</u>:

- state's largest groundwater basin;
- 86.6 million acre-feet in storage (enough to cover the entire state 2 feet deep).

Oklahoma's Water Resources

- Irrigation is the #1 use of water in Oklahoma:
  - accounts for more than 40 percent of <u>total withdrawals</u>:
    - water supply = 38 percent
  - accounts for 79 percent of <u>groundwater withdrawals</u>.

During a peak irrigation day (assuming 1,000 wells pumping at 1,000 gallons per minute), Texas County uses as much water as New York City during an average day.

Oklahoma's Water Resources

- 2,600 stream water use permits on file (OWRB):
  - appropriate 2.4 million ac-ft/year
- 9,500 groundwater permits:
  - allocate 3.2 million ac-ft/year

		Authorized	**Annual Use**
City of Tulsa	=	324,778 ac-ft/yr	139,000 ac-ft
City of Oklahoma City	=	215,463 ac-ft/yr	136,000 ac-ft

Annual Withdrawals:

Texas/Cimarron/Beaver Counties	=	445,000 ac-ft
State Municipal Water Supply	=	756,000 ac-ft

Overview
Oklahoma Water Law

- Classifications of Water & Ownership (60 O.S. Sec. 60):
  - Groundwater:
    - Private property that belongs to the overlying surface owner, though subject to reasonable regulation by the OWRB.
  - Water in a definite stream (Stream Water):
    - Public water subject to appropriation by the OWRB.

Overview
Oklahoma Stream Water Law

- Stream water is considered to be publicly-owned and subject to appropriation by the OWRB:
  - water use permits approved by 9-member Water Board.
- “First in time, first in right”:
  - first person to apply for the water right establishes a right superior to later appropriators.
- “Beneficial use is basis and limit of the appropriation right”

Overview
Oklahoma Stream Water Law

- Five Points of Stream Water Law:
  - unappropriated water is available in amount applied for;
  - there is a present or future need for the water:
  - the use is beneficial;
  - use will not interfere with domestic or existing uses; and,
  - use will not interfere with uses within stream system of origin.

Overview
Oklahoma Stream Water Law

- Avoid speculation in Stream Water Rights (before permit is issued):
  - Specify use in application
  - Present or future need (785:20-5-5)
  - Out of stream system use must protect reasonably foreseeable future use in stream system (50-year)

Overview
Oklahoma Stream Water Law

- Avoiding speculation (after permit issued):
  - Commence project (within 2 years);
  - Completion of works;
  - Forfeiture use-it-or-lose-it (7-year default):
    - requires full use of the annually authorized amount within 7 years of permit issuance and at least once in any continuous 7-year period thereafter;
    - Schedule of Use (exception for large projects) allows phased-in use over a specified period of time (lose if fail to keep schedule).

Water Use Permitting Requirements

- Applications required (except for domestic use).
- Notice of application (hearing if protested):
  - mail notice;
  - publish notice.
- Administrative Procedures Act process.

Stream Water Calculations

- Is there water available at the proposed diversion point in the amount needed?
  - Calculations based on average annual runoff over the watershed above proposed diversion point (ArcInfo Watershed Model).
  - All appropriations, estimated domestic uses (6 acre-feet per 160 acres of drainage), and reservoir dependable yields are subtracted out.

Stream Water Calculations

- Will the proposed diversion interfere with downstream domestic uses and prior appropriations?
  - All downstream appropriations and domestic uses on the stream from the proposed diversion point to the next major tributary are subtracted off of the determined flow at the diversion point.
  - Additional drainage below the diversion point may be looked at if needed to determine if interference is likely to occur.

Stream Water Calculations

- Is there available water within the stream system?
  - Available water in the stream system in question is determined using the Estimated Available Water from either the “Hydrologic Investigation of the Arkansas River Basin”, January 1998, or the “Hydrologic Investigation of the Red River Basin”, July 1998 minus all appropriations in the stream system and reservoir dependable yields.

Ensuring Water for Navigation

The Challenge:

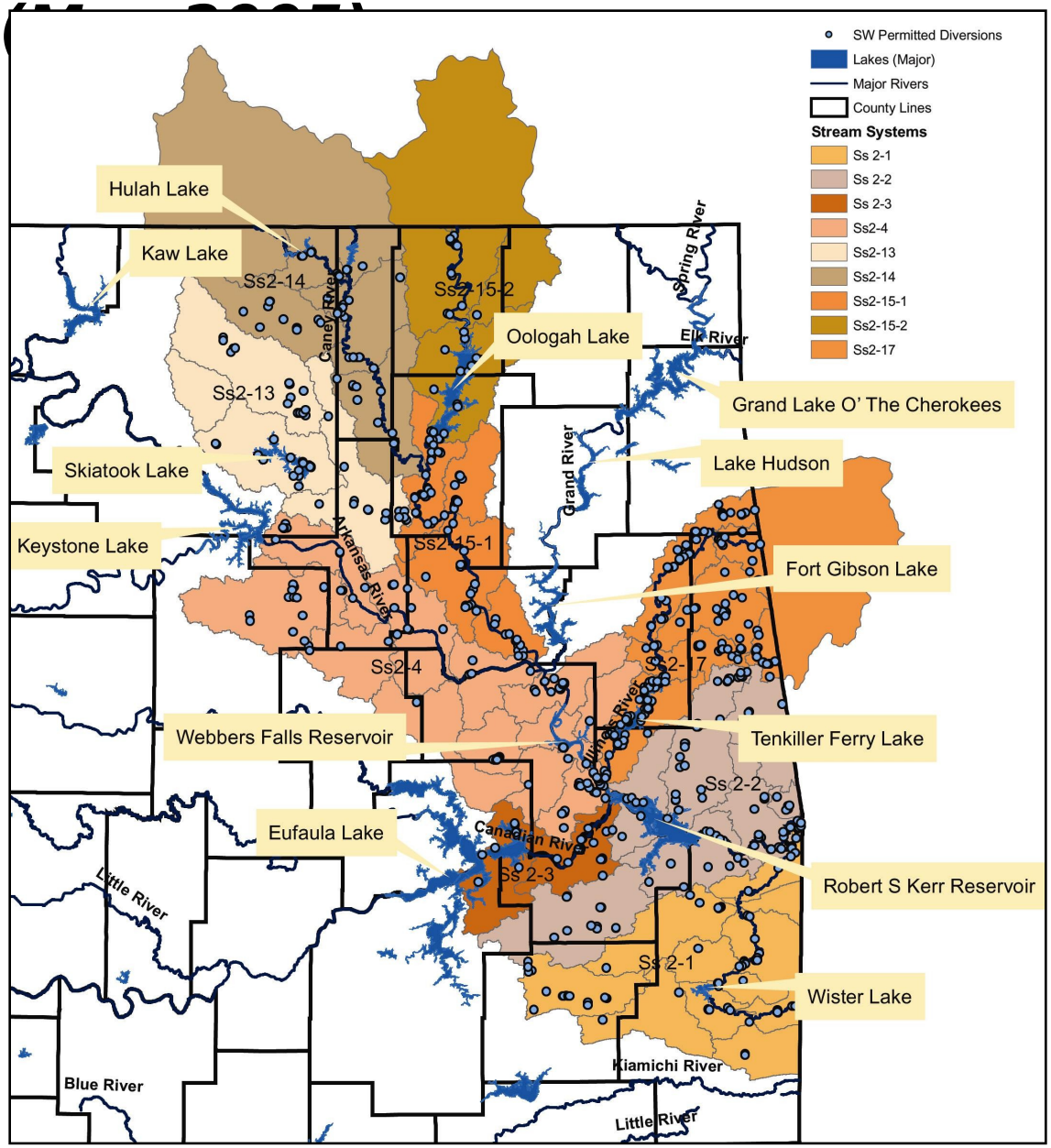
- To provide a balance between navigation needs and other permitted beneficial water use requirements during low flow/drought conditions.

Ensuring Water for Navigation

The Approach:

- Developed a partnership between the ODOT Waterways Advisory Board, OWRB, and Corps of Engineers.
- Modeled water use impacts on flows in McClellan-Kerr Arkansas River Navigation System:
  - Developed a methodology to track flows and identify water shortages.

OWRB Stream Water Permit Diversions



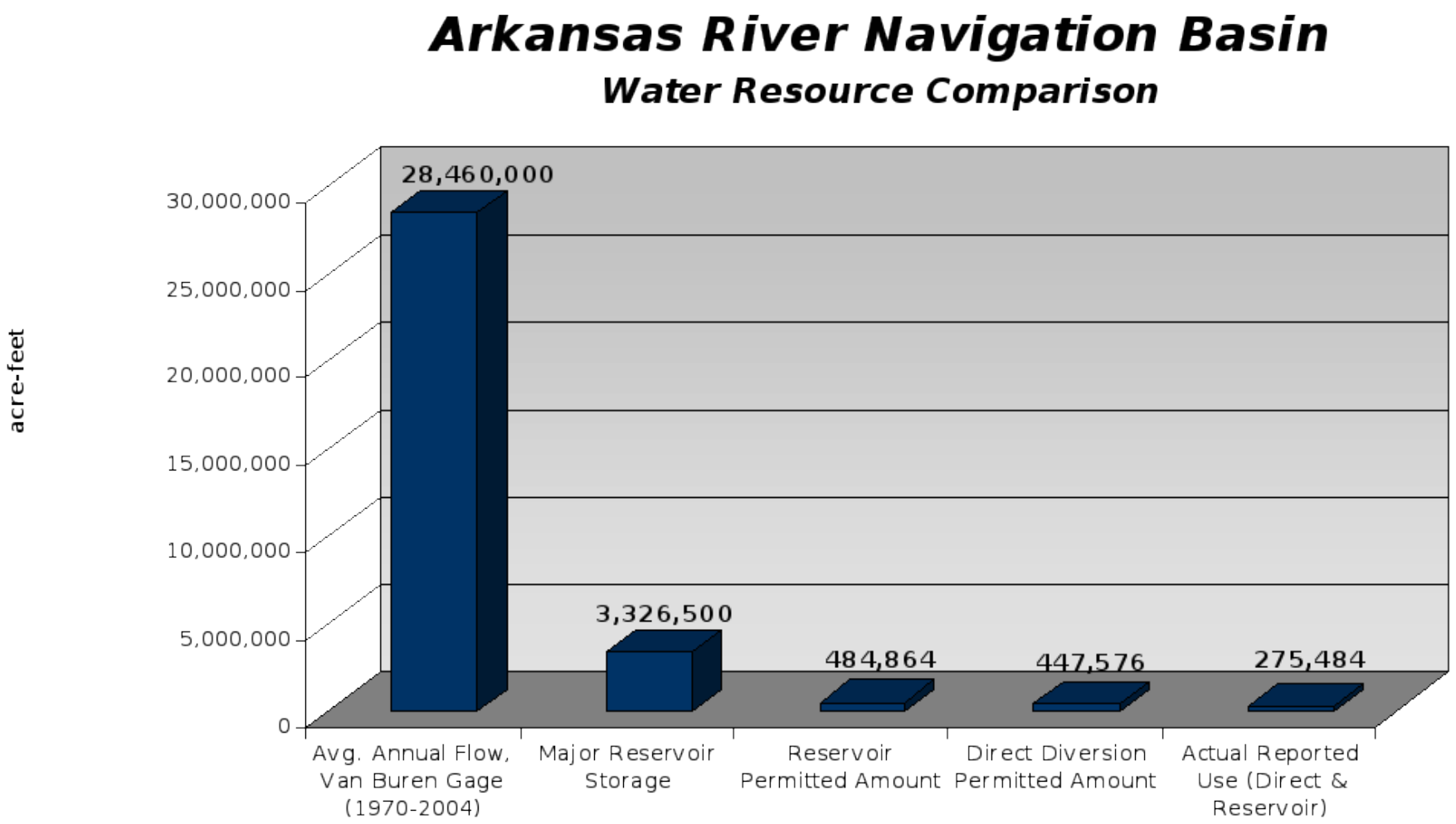
Ensuring Water for Navigation

- Navigation Requirements:
  - Verdigris River:
    - Consumptive (evaporation) = 20-45 cfs
    - Non-consumptive (lockage/leakage) = 230 cfs
    - Total = 250-275 cfs
  - Arkansas River:
    - Consumptive (evaporation) = 270-535 cfs
    - Non-consumptive (lockage/leakage) = 525 cfs
    - Total = 795-1060 cfs

Ensuring Water for Navigation

- Arkansas River USGS Gage Data:
  - #07250550 Arkansas River @ Van Buren, AR (1970-2004):
    - Max Daily Mean Flow (May 1990) = 397,000 cfs (786,060 ac-ft/day)
    - Min Daily Mean Flow (Nov. 1975) = 0 cfs (0 ac-ft/day)
    - Annual Mean Flow (period/record) = 39,280 cfs (28,460,000 ac=ft/year)
  - #07249455 Arkansas River @ Ft. Smith, AR (1997-2004):
    - Max Daily Mean Flow (Jan. 1998) = 198,000 cfs (392,040 ac-ft/day)
    - Min Daily Mean Flow (Sept. 1998) = 45 cfs (89 ac-ft/day)
    - Annual Mean Flow (period/record) = 37,700 cfs (27,310,000 ac=ft/year)
  - #07165570 Arkansas River near Haskell, OK (1973-2004):
    - Max Daily Mean Flow (Oct. 1986) = 243,000 cfs (481,140 ac-ft/day)
    - Min Daily Mean Flow (Sept. 1988) = 87 cfs (172 ac-ft/day)
    - Annual Mean Flow (period/record) = 10,720 cfs (7,764,000 ac=ft/year)

Ensuring Water for Navigation



Ensuring Water for Navigation

Results:

- Modeling indicates that navigation flows can be protected with conditions on future water right permits.
- New rule amends required permit conditions in Chapter 20 of OWRB rules (Appropriation and Use of Stream Water):
  - "Water released for navigation purposes pursuant to project operations adopted by the United States shall not be diverted…"
  - Rule effective July 1, 2005.

- ***Waterways Board/OWRB/Corps partnership key to meeting the challenge of ensuring water for navigation.***

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OWRB Navigation Rule

- Direct Diversions:

Stream System	# Permitted	Permitted Amount (ac-ft/ yr)	Reported Use (ac-ft/ yr)	# Pending	Pending Amount (ac-ft/ yr)
2-1	33	7,389	2,521	1	19,300
2-2	54	18,365	9,338	0	0
2-3	7	4,545	1,433	0	0
2-4	69	210,026	116,396	0	0
2-13	31	66,701	1,521	0	0
2-14	33	26,529	5,554	0	0
2-15-1	58	100,817	7,113	0	0
2-15-2	14	3,211	1,188	0	0
2-17	102	148,022	10,689	0	0
Totals	401	585,605	155,753	1	19,300

OWRB Navigation Rule

- A method must be developed to track flows and identify water shortages.
  - COE Model:

    Downstream inflow
    + upstream inflow (routed)
    - upstream releases (routed)
    = Net natural flow into navigation system